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## ECONOMIC IMPACTS OF INCREASED DEFENSE SPENDING

AUGUST 1982

A REPORT PREPARED FOR THE UNITED STATES AIR FORCE

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## ECONOMIC IMPACTS OF INCREASED DEFENSE SPENDING

### I. INTRODUCTION

There is much debate about the relative performance of the economy when resources are diverted from private sector and Federal Government nondefense programs to the defense sector. To shed light on this issue, an analysis of the economic consequences of various levels of real defense expenditure increases over the next 5 years was conducted. Annual increases of up to 10 percent were studied to assess sensitivities to the size of the increase. This paper summarizes our findings, considering both macroeconomic and microeconomic impacts of the overall defense budget and M-X spending in particular. The findings discussed are based on an analysis of five major econometric studies (References 1-5) about the impact of defense spending.

## II. SUMMARY OF RESULTS

Given the recessionary conditions in the economy, as evidenced by underutilized industrial capacity and a relatively high unemployment rate, a planned, accelerated growth in defense expenditures during the 1982 through 1986 period can act as an engine of sustained economic growth that applies very little pressure on inflation. Specifically, we found that

- o An accelerated real rate of increase in defense spending during the 1982 through 1986 period of up to 10 percent can be beneficial to the economy; it leads to higher rates of real GNP growth and lower unemployment rates.
- o Alternative methods of financing the increased defense expenditures may affect the magnitude of increases in real economic activity but not the direction.
- o The major concern of increasing the level of defense expenditures should be focused on microeconomic or sectoral impacts.
- o The proposed expenditure on the M-X can be expected to yield considerable economic and noneconomic benefits--increased employment, enhanced national security, technology development, increased productivity, and long-run spin-offs.

### III. MACROECONOMIC IMPACT ASSESSMENT

The economic impacts of defense spending are analyzed using three scenarios for increases in annual real defense expenditures. They are (a) Base Case (4.7 percent), (b) Moderate Case (6 percent), and (c) Accelerated Case (10 percent). The relative economic impacts of the Moderate and Accelerated Cases are examined against those of the Base Case.

The 1981 Base Case scenario for the present administration calls for 4.7 percent real growth in defense expenditures. A preliminary analysis of the macroeconomic consequences of real increases of 6 and 10 percent annually over the next 4 years, financed by a diversion of resources from Federal nondefense programs, shows that the changes in employment, real GNP, and productivity are very small. This is contrary to the often repeated statement that real GNP and employment would suffer, accompanied by a rapid rate of inflation, when resources are taken away from social programs and used for a defense buildup.

Major macroeconomic variables affected by defense spending increases include nominal and real GNP, unemployment, productivity, private-sector investment, interest rates, inflation, Federal deficit, housing starts, and income distribution. The effects of increased levels of defense spending on these variables can be expected to vary with the method of financing the defense buildup. The three commonly used alternative methods of financing defense expenditures are Federal budget deficits, tax increases, and reductions in Federal nondefense programs. The economic consequences on the U.S. economy of accelerated

levels of expenditure of 6 percent and 10 percent as compared with the 4.7 percent base case are shown in Tables 1 and 2 for these alternative means of financing.

An examination of the data in these two tables clearly demonstrates the following:

- o Increases in real GNP (output), employment, and productivity due to accelerated levels of defense expenditures over the 1981-85 period are significant.
- o Inflation rates, as measured by the GNP price deflator, will decline under all modes of financing.
- o Unemployment rates will show a continued downward trend from their 1982-83 peak.
- o Differences in the effects on employment, real GNP, productivity, and inflation among the alternative financing methods are not significant.
- o The effects of alternative methods of financing defense expenditures are more significant on interest rates, housing starts, and Federal deficits. For example, while increased public borrowing to finance defense spending results in larger Federal deficits than financing by taxation, the intersectoral transfer of expenditures from nondefense to defense leaves the Federal deficit unchanged.
- o The major impact of increased defense spending financed by reallocation of resources from nondefense programs is in the redistribution of income in favor of the military sector.

The results presented above are based on particular assumptions embodied in the Data Resources, Inc. (DRI) model. The following key economic assumptions underlie the projections presented in Tables 1 and 2:

- o The Administration's tax cut measures in the Economic Recovery Act will be implemented.

TABLE 1  
A COMPARISON OF MACROECONOMIC IMPACTS OF ALTERNATIVE  
MODES OF FINANCING DEFENSE EXPENDITURES: 6 PERCENT CASE

	<u>1981</u>	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	
<u>GNP</u> (billions of current dollars)	2,852.1 (10.8)**	3,239.5 (13.6)	3,650.4 (12.7)	4,089.8 (12.0)	4,636.3 (13.4)	B*
	2,852.2	3,246.7	3,664.4	4,099.6	4,644.5	D
	2,852.2	3,245.3	3,661.6	4,097.2	4,641.3	T
	2,853.5	3,244.1	3,655.0	4,090.9	4,635.4	R
<u>Real GNP</u> (billions of 1972 dollars)	1,433.0 ( 0.8)	1,482.2 ( 3.4)	1,524.5 ( 2.9)	1,570.1 ( 3.0)	1,644.0 ( 4.7)	B
	1,433.2	1,485.5	1,530.0	1,573.0	1,645.1	D
	1,433.1	1,484.8	1,528.8	1,572.1	1,644.2	T
	1,433.7	1,483.9	1,525.5	1,569.1	1,641.8	R
<u>Private Sector Fixed Investment</u> (billions of 1972 dollars)	140.8	148.7	156.8	161.7	169.9	B
	140.8	149.0	157.6	162.5	170.1	D
	140.8	149.0	157.4	162.4	170.0	T
	141.1	149.8	158.2	163.0	171.0	R
<u>Productivity Growth</u> (output per manhour)	1.156 (0.9)	1.174 (1.5)	1.186 (1.0)	1.202 (1.3)	1.229 (2.2)	B
	1.156	1.175	1.187	1.202	1.229	D
	1.158	1.175	1.187	1.202	1.229	T
	1.157	1.175	1.187	1.203	1.230	R
<u>GNP Price Deflator</u> (annual rate of change)	9.8	9.8	9.6	8.8	8.3	B
	9.8	9.8	9.6	8.8	8.3	D
	9.8	9.8	9.6	8.8	8.3	T
	9.8	9.8	9.6	8.8	8.3	R

\* B = Base Case Scenario with 4.7 percent real defense expenditure increase; D, T, R = Deficit Financing, Tax Increase and Reduction in Non-Defense Expenditure.

\*\* Figures in parentheses are annual percentage changes.

TABLE 1—Continued  
 A COMPARISON OF MACROECONOMIC IMPACTS OF ALTERNATIVE  
 MODES OF FINANCING DEFENSE EXPENDITURES: 6 PERCENT CASE

	<u>1981</u>	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	
<u>Federal Deficit</u> (NIPA Basis)	-44.0	-53.8	-58.1	-85.2	-82.0	B
	-44.7	-55.9	-60.9	-87.4	-86.2	D
	-44.0	-54.3	-55.8	-85.5	-82.4	T
	-43.3	-53.0	-57.7	-85.7	-82.8	R
<u>Prime Interest Rate</u>	13.80	14.97	14.92	12.92	12.20	B
	13.80	14.97	15.01	13.11	12.31	D
	13.80	14.97	14.98	13.05	12.26	T
	13.78	15.01	15.06	13.06	12.26	R
<u>Unemployment Rate</u>	7.9	7.4	7.1	7.2	6.7	B
	7.9	7.3	7.0	7.1	6.6	D
	7.9	7.3	7.0	7.2	6.6	T
	7.9	7.3	7.1	7.3	6.7	R
<u>Housing Starts</u> (million units)	1.440	1.773	1.690	1.797	2.057	B
	1.431	1.735	1.609	1.675	1.934	D
	1.440	1.772	1.681	1.776	2.037	T
	1.438	1.762	1.664	1.761	2.027	R

TABLE 2  
A COMPARISON OF MACROECONOMIC EFFECTS OF ALTERNATIVE  
MODES OF FINANCING DEFENSE EXPENDITURES: 10 PERCENT CASE

	<u>1981</u>	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	
<u>GNP</u> (billions of current dollars)	2,852.1	3,239.5	3,650.4	4,089.8	4,636.3	B*
	2,860.8	3,271.0	3,706.9	4,170.3	4,752.2	D
	2,858.8	3,264.7	3,693.5	4,148.9	4,721.0	T
	2,852.6	3,241.6	3,654.0	4,093.1	4,639.5	R
<u>Real GNP</u> (billions of 1972 dollars)	1,433.0	1,482.2	1,524.5	1,570.1	1,644.0	B
	1,437.4	1,496.3	1,546.3	1,596.3	1,675.5	D
	1,436.3	1,493.2	1,540.4	1,588.0	1,665.0	T
	1,433.3	1,483.0	1,525.3	1,570.1	1,643.0	R
<u>Private Sector Fixed Investment</u> (billions of 1972 dollars)	140.8	148.7	156.8	161.7	169.9	B
	141.3	150.5	160.3	166.2	175.0	D
	141.1	150.1	159.5	165.1	173.7	T
	140.9	149.3	158.0	163.5	172.1	R
<u>Productivity Growth</u> (output per manhour)	1.156	1.174	1.186	1.202	1.229	B
	1.157	1.178	1.192	1.208	1.238	D
	1.157	1.177	1.190	1.206	1.235	T
	1.156	1.175	1.187	1.203	1.231	R
<u>GNP Price Deflator</u> (annual rate of change)	9.8	9.8	9.6	8.8	8.3	B
	9.8	9.8	9.7	9.0	8.6	D
	9.8	9.8	9.7	9.0	8.5	T
	9.8	9.8	9.6	8.8	8.3	R
<u>Federal Deficit</u> (NIPA basis)	- 44.0	- 53.8	- 58.1	- 85.2	- 82.0	B
	- 46.5	- 61.3	- 70.7	- 107.5	- 117.3	D
	- 44.1	- 55.5	- 57.7	- 85.5	- 83.6	T
	- 43.7	- 52.9	- 56.6	- 84.1	- 81.4	R
<u>Prime Interest Rate</u>	13.80	14.97	14.92	12.92	12.20	B
	13.81	15.09	15.34	13.67	13.07	D
	13.80	15.03	15.17	13.30	12.53	T
	13.79	14.97	14.98	13.05	12.32	R

\* B = Base Case Scenario with 4.7 percent real defense expenditure increase; D, T, R = Deficit Financing, Tax Increase and Reduction in Non-Defense Expenditure.

TABLE 2—Continued

## A COMPARISON OF MACROECONOMIC EFFECTS OF ALTERNATIVE MODES OF FINANCING DEFENSE EXPENDITURES: 10 PERCENT CASE

	<u>1981</u>	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	
<u>Unemployment Rate</u>	7.9	7.4	7.1	7.2	6.7	B
	7.8	7.1	6.7	6.7	6.1	D
	7.8	7.2	6.8	6.9	6.3	T
	7.9	7.4	7.1	7.2	6.7	R
<u>Housing Start</u> (million units)	1.440	1.773	1.690	1.797	2.057	B
	1.436	1.754	1.634	1.673	1.882	D
	1.437	1.760	1.652	1.718	1.958	T
	1.439	1.768	1.673	1.762	2.010	R

- o Tight monetary policy will be pursued by the Federal Reserve System such that it will not accommodate growth in budget deficits resulting from tax cuts.
- o Real growth in Federal expenditure will be limited to approximately 3 percent a year over the period under consideration.
- o Energy prices will continue to rise, but at a decelerating rate.

#### A. Multiplier Effects

The explanation for dramatic increases in real GNP due to accelerated defense-expenditure growth is to be found in the large defense-sector multipliers. As shown in Table 3, the expenditure-output multiplier of directly affected, defense-sector industries averages around 2.00, or about 30 percent higher than the average nondefense real multiplier of about 1.56. That is, given similar increases in government expenditures for defense and nondefense programs during the 1982 through 1986 period, the rise in real GNP will be almost 30 percent greater in defense-sector production than in non-defense activities. Thus, defense spending is a more effective stimulant than other government spending. This is so because defense is more capital-intensive, and thus creates a greater economic multiplier for the dollars invested.

#### B. Inflation

There is no conclusive empirical evidence that shows defense spending is inherently more inflationary than other kinds of government spending, such as expenditures on school buses and museums. If the record of the past two decades is any proof, the relationship between the proportion of GNP devoted to military expenditures and the rate of inflation is extremely tenuous. For instance, since the early 1960s, defense spending as a proportion of GNP has declined from 9

TABLE 3  
SECTORAL EXPENDITURE-OUTPUT MULTIPLIERS

<u>YEAR</u>	<u>\$10 BILLION SPENDING INCREMENT</u>	
	<u>DEFENSE</u>	<u>NONDEFENSE</u>
1	1.40	1.33
2	1.90	1.51
3	2.16	1.65
4	2.12	1.67
5	2.02	1.58
<u>6</u>	<u>2.41</u>	<u>1.62</u>
AVERAGE	2.00	1.56

SOURCE: Gary Ciminero, Impact of Defense of the United States Economy: Macroeconomic Effect, Merrill-Lynch Economics Inc., October 1980.

percent to under 5 percent, while the GNP deflator has escalated from 1 percent to 9 percent. That is, a high defense burden has been associated with a low rate of inflation and vice versa.

The fears that accelerated defense spending will be inflationary are based on the experience of the 1965-68 Vietnam defense buildup. However, the comparison between the Vietnam and current peacetime defense spending is not valid based on a systematic analysis of the following factors: (a) productive capacity of the economy, (b) composition of defense spending, and (c) planning and timing of defense spending.

#### 1. Productive Capacity

Aggregate demand consists of private sector investment, consumer spending, and government outlays. When aggregate

demand was rising rapidly under high levels of employment (full productive capacity) during 1965-68, further increases in defense spending necessitated the transfer of resources from the civilian sector to military production and thus led to inflationary pressure. However, actual output (real GNP) in the current recessionary conditions is far below the potential output capacity (full employment of resources). The manufacturing capacity utilization rates have declined from 85 percent in 1979 to about 73.1 percent during the first quarter of 1982.

Table 4 presents the capacity utilization statistics across the six recessions since 1950. It clearly demonstrates the greater severity of the current recession compared with the earlier ones. Indeed, the demand placed by the accelerated increase in defense spending on industrial sectors has caused questions about bottlenecks and inflation. However, the available statistics on industrial production and capacity utilization clearly suggest that the defense demands can be easily accommodated. As such, there is sufficient room for much greater levels of planned defense expenditures during the 1982-87 period to exploit productive capacity and raise the levels of employment, output, and productivity without leading to undue pressure on general inflationary situations.

Further, defense spending, as proposed by the present Administration for the 1982-87 period, will tend to stimulate private-sector investment and industrial capacity utilization. Thus, the issue in the current peacetime recessionary conditions is not the classic case of choosing between guns and butter. Rather, the strategy is to harness the full potential productive capacity of the economy to produce more of both consumer (civilian) and defense-related goods and services, with the defense production acting as a stimulant for non-defense-sector economic activity.

TABLE 4  
CAPACITY UTILIZATION RATES DURING RECESSION  
(PERCENTAGE)

	RECESSION PERIOD (Year and Quarter)					
	<u>1954:3</u>	<u>1958:2</u>	<u>1970:4</u>	<u>1975:1</u>	<u>1980:3</u>	<u>1982:1</u>
Manufacturing (Total)	79.1	72.4	76.6	70.3	75.9	71.5
Advanced Processing Industries	79.0	73.3	74.3	70.4	77.4	73.4
Primary Processing Industries	79.7	71.1	80.8	69.9	73.1	68.1

SOURCE: DRI, Defense Economics Research Report, Vol II, No.4, April 1982.

## 2. Composition of Defense Spending

Unlike the concentration on personnel during the Vietnam era, the principal focus of the current Administration's defense budget requests is on production, including weapon systems, parts, and related R&D. The difference in emphasis can be expected to result in technological advances, the impact of which would be short-run increases in capital formation, productivity, and productive capacity of the economy. The long-run spin-offs of defense-related technology development to the civilian-goods sector may be impressive, as was evidenced by the earlier 1960-1970 experiences.

### 3. Timing of Defense Expenditures

Unlike the sudden and massive increase in defense expenditures over a 2-year period during the Vietnam buildup that resulted in a considerable rate of inflation in the face of full employment, the proposed defense buildup calls for an orderly and gradual increase in military expenditures spread over 5 years. Such a long-range strategy of planned expansion of the defense sector can prevent, or at least reduce, the severity of "bottleneck inflation" in critical sectors of the economy. In fact, some of the prevailing shortages of strategic raw materials, as well as the current long production leadtime experienced in major weapons development and production, can be reduced by the proposed long-run defense buildup strategy.

The major impact of the Administration's force modernization program is on the durable goods manufacturing sectors. This can be seen from a comparison of the growth rates for six major industry groups--aerospace, electronics and communications, primary metals, chemicals, fabricated metals, and machinery, except electrical--as shown in Table 5. It is true that the forecast growth rates for these industries show substantial increases over their recent performance. Further, the defense output growth rates show considerably greater increase than the total output growth. Such an accelerated growth will have to be met by a substantial investment in plants and equipment and parallel employment and training programs if bottlenecks and price pressures are to be avoided. Based on a detailed econometric analysis of industries, the DRI report concludes that "the recession, with its high unemployment and low utilization rates, has, however, provided industry with a comfortable leadtime within

TABLE 5  
 DURABLE GOODS INDUSTRY GROWTH  
 (AVERAGE ANNUAL PERCENT GROWTH IN REAL OUTPUT)

AGGREGATE SECTOR	HISTORICAL GROWTH RATE 1976-1981		FORECAST GROWTH RATE 1982-1987	
	TOTAL OUTPUT	DEFENSE OUTPUT	TOTAL OUTPUT	DEFENSE OUTPUT
AEROSPACE	7.0	6.5	11.8	16.1
ELECTRONICS & COMMUNICATIONS	12.4	2.9	12.0	16.3
PRIMARY METALS	1.2	2.7	6.0	14.2
CHEMICALS	3.6	3.8	5.6	12.3
FABRICATED METALS	2.0	2.0	6.8	14.5
MACHINERY, EXCEPT ELECTRICAL	2.7	3.6	6.2	14.0

SOURCE: DRI, Defense Economics Research Report, Vol II, No. 3, March 1982.

which to make these capital and work force requirements.... Defense output can be expanded without placing pressure on capacity, the labor force, or prices."<sup>6</sup>

Unlike the sudden and rapid defense buildup during 1965-68, the current Administration's proposed increases in defense expenditures for the 1982-87 period can easily be accommodated by the economy, with very little economic dislocation in the private sector.<sup>7</sup>

#### C. Defense Outlays as a Share of GNP

The Five-Year Defense Plan announced by the administration envisions an annual average real growth rate of about 8 percent in defense budget outlays for the period 1983-87. The real growth in defense spending averaged only 1.8 percent during the 1975-81 period when the defense budget share of the total Federal Government budget declined from 26.4 percent to 24.3 percent, and the share of GNP remained around 5.5 percent. Defense outlays in 1982 show an even steeper decline since 1968 (Vietnam era). Outlays that in 1968 were 45.2 percent and 9.2 percent of the Federal budget and GNP, respectively, stand at 25.2 percent and 5.8 percent in 1982.

Another barometer of the relatively huge reduction in defense funding is the share of the labor force in the defense sector. The defense share declined from 10 percent in 1968 to 5.1 percent in 1982, a dramatic 50 percent reduction. During the same period, Soviet investment growth-rates reached unprecedented peacetime levels. "As a consequence, the catch-up costs for restoring military capabilities will be substantial."<sup>8</sup>

To meet the national security threat posed by the enormous Soviet defense buildup, the proposed defense budget

requests for 1982-87 amount to increasing the defense share of GNP from 5.8 percent to 7.1 percent, which is still far short of the 9.2 percent level achieved in 1968 and 13.7 percent in 1953. Even a cursory look at Table 6 and Figure 1 will show that the proposed, increased levels of defense outlays are a relatively small share of GNP compared with postwar historical standards. Furthermore, the proposed defense buildup process is better planned and more orderly. It is important to recognize the small size of defense expenditures relative to GNP because it permits us to accomplish the proposed defense buildup in real terms with relatively small amounts of money and diversion of resources. For example, less than \$1 per wage earner per week would be sufficient to provide an increase in real defense expenditures of \$4 billion, or 3 percent. Because of the small size of military expenditures, the current discussions of the DOD's need for additional funds are conservative relative to present military goals. Even a 10 percent increase in real defense expenditures is not sufficient to enable our armed forces to accomplish all of the missions for which we would like them to be prepared.

The question is not whether we can afford a higher level of defense spending, but whether we have the will to do so. It calls for our capacity to wean ourselves away from the recent enormous and rapid growth in Federal nondefense expenditures (as shown in Figures 2 through 4), particularly transfer payments to which we have grown accustomed. The growth in transfer payments has more than matched the precipitous decline in defense expenditures as a percentage of GNP. It will not be easy to go through the transition, but the contemplated increases in defense spending are not unusual compared with the 1950s and 1960s standards.

TABLE 6  
TRENDS IN DEFENSE BUDGET OUTLAYS AND DEFENSE LABOR FORCE\*

<u>FISCAL YEAR</u>	<u>DEFENSE BUDGET AS A PERCENTAGE OF</u>		<u>LABOR FORCE IN DEFENSE (PERCENTAGE)</u>
	<u>FEDERAL BUDGET (OUTLAYS)</u>	<u>GROSS NATIONAL PRODUCT</u>	
1950	30.8	4.6	4.6
1953	66.2	13.7	14.8
1964	45.2	8.4	8.2
1968	45.2	9.2	10.0
1975	26.4	5.5	5.3
1980	23.6	5.2	4.8
1981	24.3	5.5	5.0
1982**	25.2	5.8	5.1
1983	28.5	6.1	N/A
1984	30.6	6.4	N/A
1985	32.9	6.7	N/A
1986	35.0	7.0	N/A
1987	36.4	7.1	N/A

\* Calculated from Economic Report of the President, 1982,  
and Budget of the United States Government, Fiscal Year  
1983

\*\* Figures for the period 1982 through 1987 are estimates.

FIGURE 1  
DEFENSE OUTLAYS AS A PERCENTAGE OF GNP

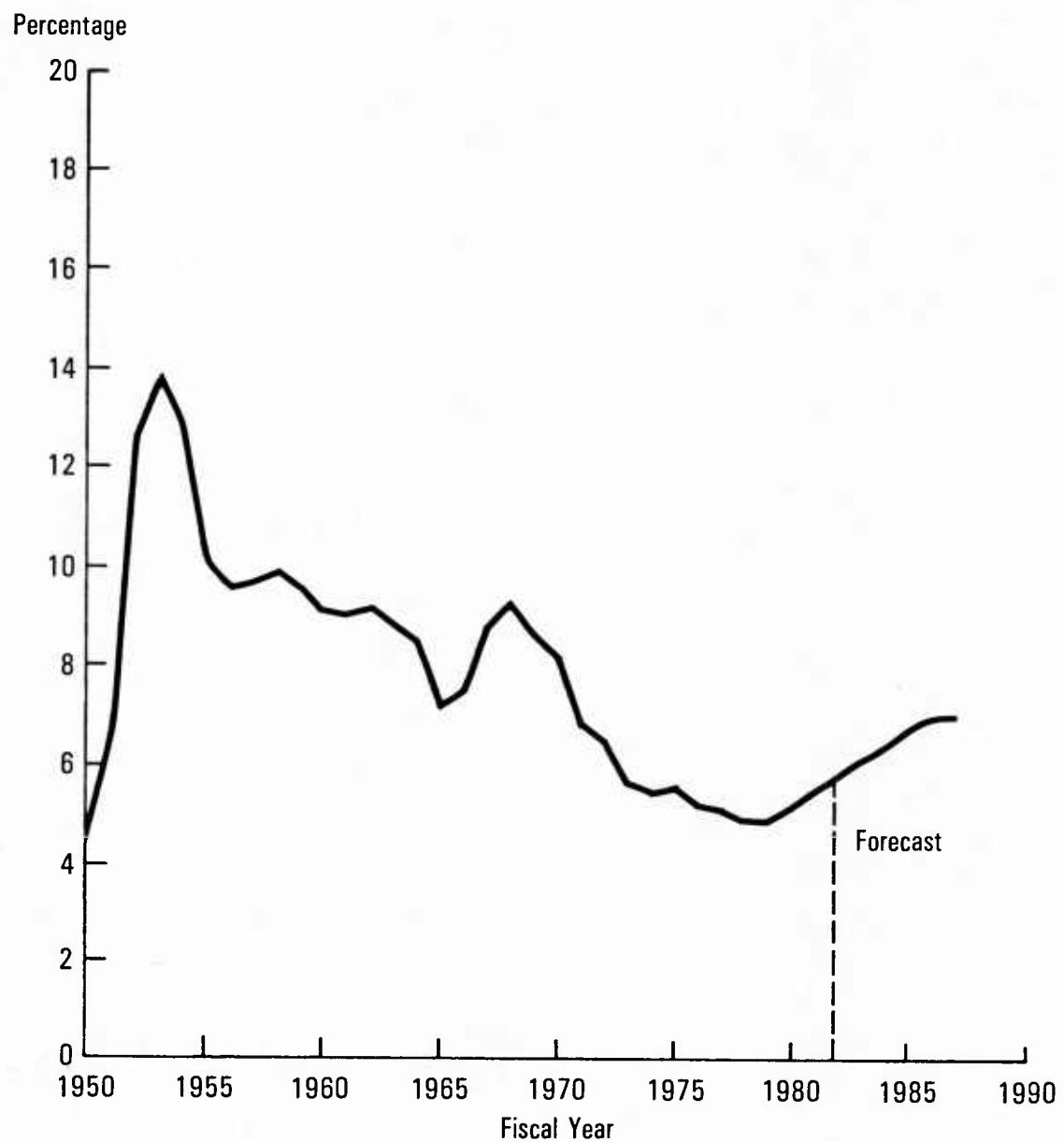


FIGURE 2  
DEFENSE OUTLAYS AS A PERCENTAGE OF FEDERAL BUDGET

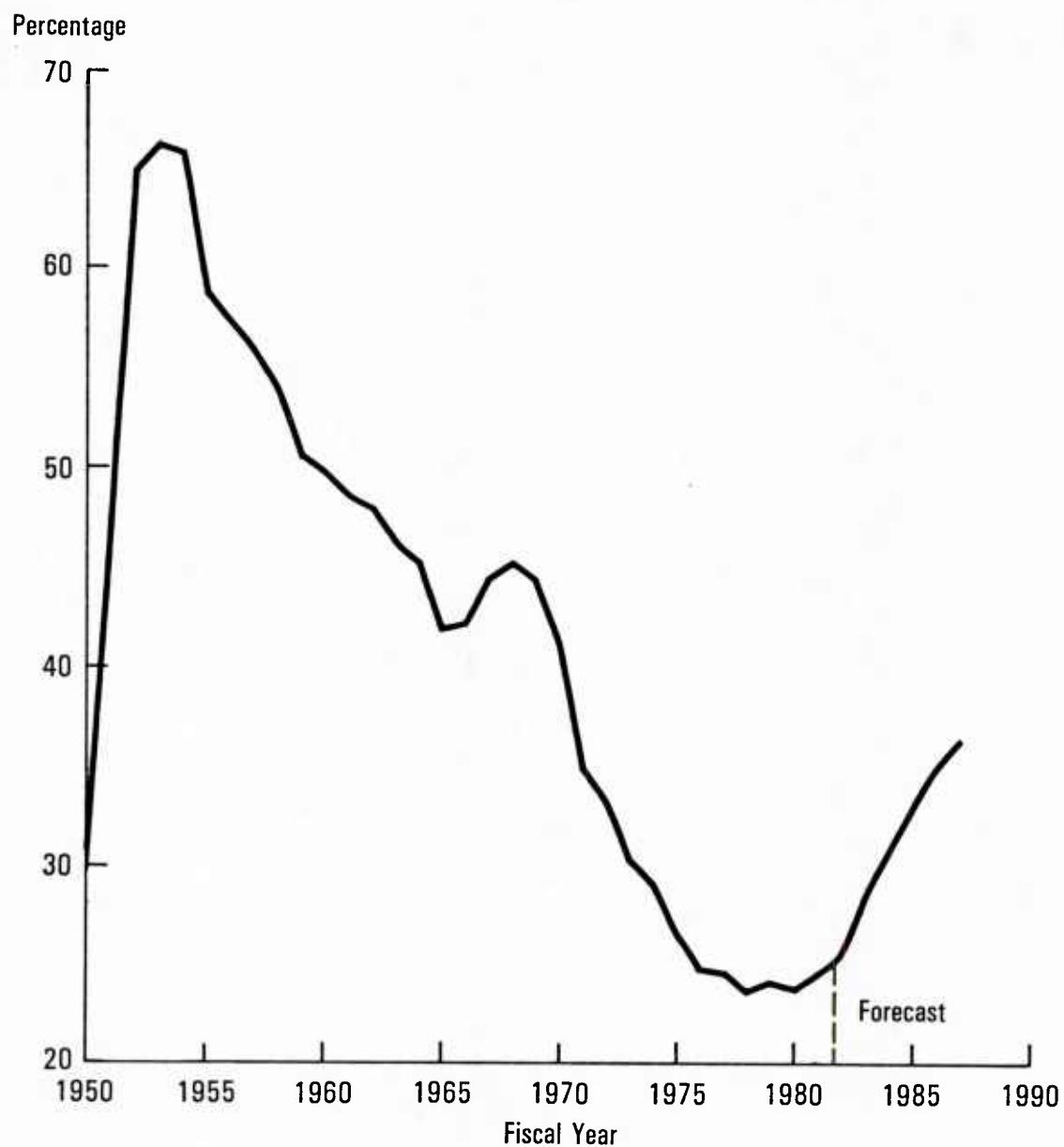


FIGURE 3  
CHANGING FEDERAL BUDGET

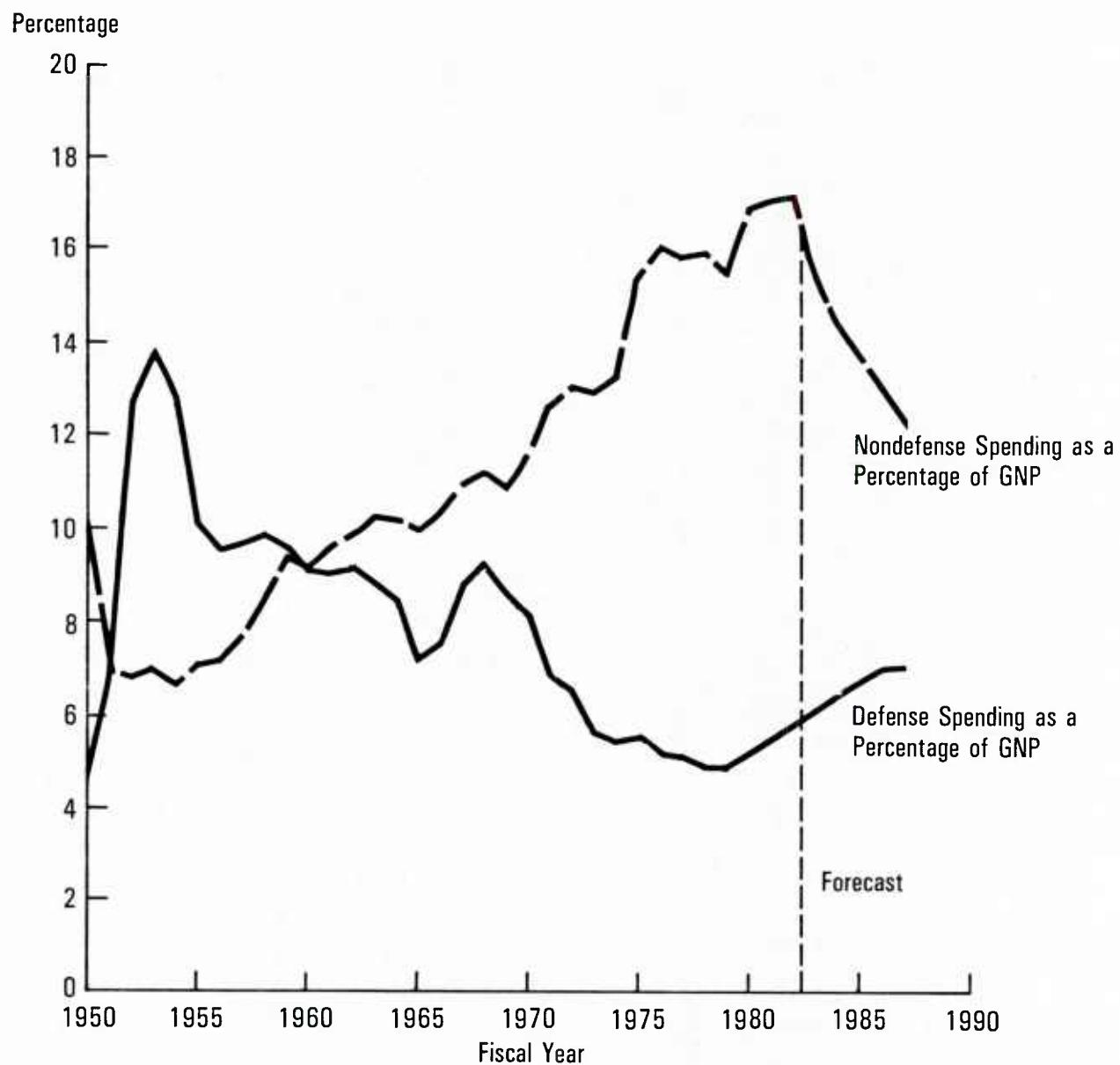
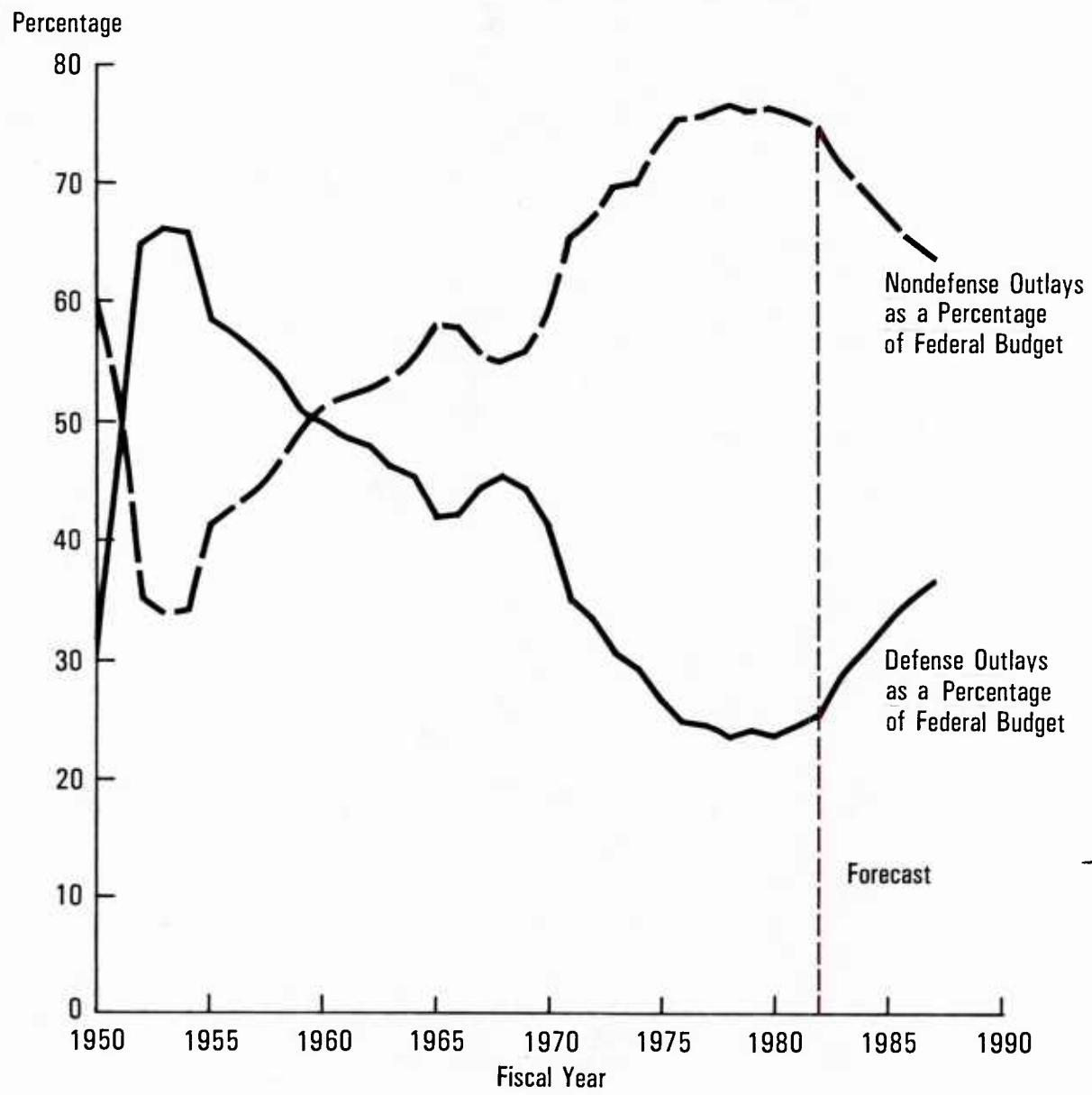


FIGURE 4  
FEDERAL BUDGET OUTLAYS



#### IV. MICROECONOMIC IMPACT ASSESSMENT

It is clear from the macroeconomic analysis of defense expenditures that the U.S. economy can expand adequately to absorb as much as 10 percent annual real growth in defense expenditures, which is more than the Administration has envisioned for the 1983-87 period. Further, the differences in the projected effects on major economic variables--such as employment, output, and prices--due to alternative means of financing defense expenditure (tax increases, deficit financing, or reduction in nondefense spending) are not so significant as to cause concern.

The contribution of the proposed defense spending increases in terms of employment and output growth, as well as revenue base, will be critical for many regional economies. This is particularly so because of the Administration's policy measures purported to reduce other Federal spending and transfer programs.

The major economic impacts resulting from increased defense expenditures are regional and sectoral in nature. They depend on the composition of defense purchases of goods and services from specific industries. Important economic consequences of defense expenditures are to be seen in the differential regional impacts on specific industries in terms of output, employment, and relative prices, as well as on the demand for various public services, such as housing, police and fire departments, education, etc. These consequences can be expected to vary widely among industries in different regions of the country, depending on the composition of defense purchases, input requirements (labor, capital, raw materials), and the resource capability of the affected region.

#### A. Multiplier Effects

Defense expenditures, like any private sector expenditures, have "multiplier" effects on output and employment. An initial amount of government defense spending for purchases of output from an industry results in a total direct and indirect production and employment whose value is greater than the initial amount. The output multipliers, as shown in Table 7, vary among defense industries. As such, the contribution of defense expenditures to regional and specific industry, output and employment depends on the composition of defense purchases. However, these differences at the aggregate level of employment and output are not significant.

The economic fortunes of certain regions and states depend not only on the level of defense expenditures but on the composition and emphasis of the defense-industry buildup. For example, the multipliers for procurement spending are greater than those for other large budget categories such as military pay and O&M. The average multiplier for defense procurement is about 2.00, with the multipliers within the procurement category, as shown in Table 8, ranging from 2.34 for aircraft procurement to 1.89 for shipbuilding and conversion.

#### B. Missile Procurement

The multiplier for missile procurement, 2.01, suggests that every \$1 billion spent by DOD for missile procurement generates total economic activity worth \$2.01 billion. The resulting aggregate economic activity, about twice the initial procurement spending, is distributed among various goods and services industries serving the DOD. The increase in total economic activity reflects the macroeconomic and

TABLE 7  
OUTPUT MULTIPLIERS FOR KEY DEFENSE SECTORS

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Ammunition . . . . .	2.30
Computers and Related Machines . . . . .	2.27
Aircraft Engines and Engine Parts . . . . .	2.26
Engineering and Scientific Instruments . . . . .	2.23
Aircraft . . . . .	2.18
Ships and Boats . . . . .	2.12
Other Ordnance . . . . .	2.07
Aircraft Parts and Equipment . . . . .	1.96
Electronic Components . . . . .	1.93
Communications Equipment . . . . .	1.82
Complete Guided Missiles . . . . .	1.59

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SOURCE: Robert D. Shriner, The Microeconomic Impact of Increased Spending, Chase Econometrics, November 1981.

TABLE 8  
MULTIPLIER IMPACTS OF DEFENSE PROCUREMENTS

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Missile Procurement . . . . .	2.01
Aircraft Procurement . . . . .	2.34
Shipbuilding and Conversion . . . . .	1.89
Other Procurement . . . . .	2.00

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SOURCE: Data Resources, Inc., Defense Economics Research Report, Vol I, No. 2, August 1981

interindustry impacts induced by the increased level of defense spending. Similarly, a reduction in DOD spending of \$1 billion for missile procurement will result in a decline of economic activity valued at \$2.01 billion, which will be reflected in reduced levels of employment, investment, and output in industries related to missile procurement. It should be noted, however, that the exact multiplier depends on the mix of specific programs within the missile procurement category.

Also, shifts among DOD spending accounts within the general category of procurement can affect the impacts on selected key industries. For example, a shift in procurement spending from shipbuilding to aircraft and missiles will primarily benefit firms within the aerospace industry and hurt firms in the shipbuilding and repair industry.

A key indicator of the impacts of defense spending on regional industries is the prime contract awards. An examination of the available data shows that over half of the prime contract awards are concentrated in seven states: California, New York, Texas, Connecticut, Massachusetts, Missouri, and Virginia. However, the indirect supplying industrial sectors are spread out across the country. An assessment of the full effects of the Administration's defense spending plan will require detailed analysis of sectoral- and regional-specific issues.

## V. ECONOMIC IMPACT OF M-X SPENDING

An analysis of the proposed expenditures on the M-X missile readily indicates that it will have significant economic benefits to the economy in general, and to individual sectors, industries, and states in particular. For example, California and Massachusetts will be immediate major economic beneficiaries because of the high concentration of M-X contractors in these states. To the extent the M-X missile program involves construction rather than equipment, the probability of increased spending creating demand pressures on the production of critical civilian goods, tactical military hardware, and electronic equipment is reduced.

An M-X deployment in existing silos, with follow-on deployment to enhance the system, would require appropriations of about \$23 billion, with outlays of about \$19 billion over the 1982-87 period.

If the M-X program is restructured towards early initial operational capability of closely spaced basing (CSB), appropriations will be about the same, while outlays will be 19.5 billion over the 1982-87 period. Estimates of annual expenditures and employment impacts for both the current program and the M-X CSB alternative are shown in Table 9.

The proposed M-X expenditure can be expected to generate— jobs not only in the missile industry directly, but also through indirect employment effects on the related industries that supply inputs to the production of missiles. Further, the incomes generated in the process of production of missiles and construction will, in turn, have induced consumption effects on other industries and services throughout the

**TABLE 9**  
**M-X BUDGET OUTLAYS AND EMPLOYMENT IMPACTS**  
**1982-1987**

<u>Base Mode</u>	<u>FY82</u>	<u>FY83</u>	<u>FY84</u>	<u>FY85</u>	<u>FY86</u>	<u>FY87</u>	<u>TOTAL</u>
<u>Silo Program*</u>							
Outlays**	\$1,661	\$2,450	\$3,563	\$3,812	\$3,723	\$3,764	\$18,973
Employment	166,100	245,000	356,300	381,200	372,300	376,400	316,200***
<u>CSB</u>							
Outlays**	\$1,661	\$2,074	\$2,981	\$3,982	\$4,541	\$4,299	\$19,538
Employment	166,100	207,400	298,100	398,200	454,100	429,900	325,633***

\* M-X silos and follow-on combined

\*\* Outlays in millions of 1982 dollars

\*\*\* Annual average for the FY 1982-87 period

economy. Therefore, any estimation procedure to determine the total economic impacts of the M-X program should consider not only the direct and indirect production effects, but also include the induced employment effects resulting from consumer expenditure.

Preliminary estimates of the number of jobs related to the proposed M-X program are provided in Table 9. The estimates are computed using the familiar economic multiplier analysis. Based on the input-output model data,<sup>9</sup> the simple output multiplier for complete guided missiles is 1.978. This takes into account only the direct and indirect changes in output resulting from an increase in the final demand for missile industry. As mentioned above, a more realistic measure of the total economic impact of a development project is the gross output multiplier that takes into account the direct and indirect effects indicated by the simple output multiplier in the input-output model, plus the induced changes in output resulting from increased consumer spending.

A modified version of the Regional Industrial Multiplier System, originally developed at the Bureau of Economic Analysis, U.S. Department of Commerce, estimates the gross output multiplier for the missile industry for the U.S. economy to be 4.47.<sup>10</sup> Admittedly, the gross output multiplier will vary between regions, depending on the structure of particular industry and regional economic characteristics. But overall economic impacts, represented by gross output multiplier, will always be larger than its simple income multiplier counterpart.

Based on the gross output multiplier, the proposed M-X missile program can be expected to generate approximately

100,000 new jobs nationally for every \$1 billion expenditure per year, for 6 years. As can be seen in Table 7, both the current program and the M-X CSB alternative can be expected to generate over 300,000 jobs per year for 6 years for the economy as a whole.

Further, given the gross output multiplier of 4.47 for M-X expenditures, the proposed M-X expenditures can be expected to result in a substantial increase in real GNP and in Federal Government tax receipts over the 6 years, which can be used to retire a large portion of the initial Federal expenditure incurred to finance the program.

In addition to the aforementioned significant and immediate employment, output, and fiscal effects, the M-X missile program can be expected to yield considerable economic and noneconomic spillover benefits. The spillover or fallout benefits of defense R&D into the civilian economy refer to differences in the value of goods and services produced in the civilian economy with or without such defense-sponsored R&D undertakings. It is impossible to measure the spillover benefits in concrete terms because of many indirect benefits involved, as well as the different direction that the civilian R&D efforts would have taken in the absence of military R&D.

However, based on recent experiences with respect to the contribution of the space program to commercial applications, technology transfer, other than the product type of transfer that is most often publicized, has had, and will continue to have, the greatest impact. For instance, a major legacy of the post-WW II defense expenditures was the accelerated creation of new civilian industries: computers, jet aircraft, nuclear power, and space communications. In each case,

development began with a perceived military need, and DOD R&D money brought these industries along until civilian markets were created. Given the sophisticated nature of the advanced technology involved in the development of the M-X, it is not unreasonable to expect similar spillover benefits to the economy in general. A careful cost-benefit analysis of the impact of M-X spending should consider both the short-run and long-run economic and noneconomic effects (spillover effects or externalities), including technology development, increased productivity, national security, and spin-offs.

## VI. CONCLUSIONS

Our analysis of several major econometric studies leads to the following conclusions:

A planned, accelerated growth in defense expenditures can be beneficial to the general economy because it can result in greater levels of real GNP and productive-capacity utilization without causing undue pressure on the general inflation rate.

Given similar increases in Federal Government expenditures for defense and nondefense programs during the 1982 through 1986 period, the rise in real GNP will be greater due to defense-sector production than in nondefense activities--defense spending is a more effective stimulant than other forms of government spending.

The major economic consequences of increased defense expenditures are microeconomic and regional in nature.

The proposed expenditures on M-X can be expected to have considerable beneficial economic and noneconomic impacts on the economy in general, and on specific regions and sectors in particular.

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